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ART. XII.—*The Tertiary Sands and Older Basalt of Coburg, Pascoe Vale, and Campbellfield, Victoria.*

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1. Introduction.

The area dealt with in this paper comprises part of the northern suburbs of Melbourne, and includes the City of Coburg, the south-western portion of the Shire of Broadmeadows, and the western portion of the City of Preston.

The area has been mapped previously, and is shown on Quarter-sheets Nos. 1N.W., 1N.E., 2S.W., and 2S.E. of the Victorian Geological Survey.

Portions of the older basalts have been mentioned by T. S. Hart(2) and R. A. Keble(3), and petrological descriptions given by E. W. Skeats(6) and D. M. McCance(4). The geology east of Sydney-road, Coburg, is described by G. A. Cook(1) and R. B. Pretty(5). Re-mapping has been aided by numerous sewerage excavations, and has revealed considerable modifications in the geological boundaries as shown on the Quarter-sheets. Outcrops of Older Basalt have been altered and extended, Silurian and Tertiary inliers are shown in the Newer Basalt at Coburg, while the sands and clays at Campbellfield have been recognized as pre-Older Basalt, instead of Newer Pliocene as on the Quarter-sheet.

2. Physiography.

The area is for the most part a plain. It is composed of Silurian, Older Basalt, Tertiary, Newer Basalt, and Pleistocene rocks, and slopes from 400 feet in the north to 190 feet in the south.

Towards the western boundary the plain is dissected by the wide and deep valley of the Moonee Ponds Creek, and in its eastern portion by the comparatively narrow and shallow valleys of the Merri Creek and Edgar's Creek.

The central portions of the area are dissected by three intermittent streams which rise in areas of Tertiary rock. Dry Creek rises in the Northern Golf Links, Glenroy, and joins the Moonee Ponds Creek near Pascoe Vale Railway Station; Manchester's Creek drains central Coburg from about the junction of Sussex and Gaffney streets, and joins the Moonee Ponds Creek in Brunswick south of Moreland-road; while Deanery Creek flows from Campbellfield and joins the Merri Creek just north of the Lake Reserve, Coburg. This stream has a winding course, and the valley is very shallow. The two former flow in deeply entrenched valleys.

3. Older Basalt and Leaf Beds.

These rocks are exposed in a number of places in the district, usually in the sides of the creek valleys.

Exposures on Moonee Ponds Creek.

Exposures occur on the Moonee Ponds Creek at Moreland-road. Here the basalt overlies Silurian on the south side and Tertiary river sands on the north. An impure common opal is found in the joints of the basalt. A few hundred feet north and adjacent to the gasometer is another exposure, overlying beds of fine white sand and sandy clay. A few fossil leaves have been secured from these sands.

The next and most interesting exposure occurs a few feet north of the bridge at Reynards-road. It consists of a strip of Older Basalt about 10 feet wide. The upper portion consists of narrow, vertical columns, and is fairly well preserved, while the lower portion is decomposed to a white clay. The stream whose valley has been filled with lava is part of a small tributary that came from a south-easterly direction and ran east and west at this point. It has had portion of the banks on each side preserved. The north bank is Silurian. The south bank is composed of a bed of coarse sand, a conglomerate containing large pebbles of quartz and Silurian sandstone and fine sand, the whole mass being cemented with iron oxide. Fossil leaves were collected in the fine sand, which is in a bed 2 inches thick, overlying the coarser deposits. These coarse deposits underlying Older Basalt do not occur elsewhere in the area. This exposure is marked on Quarter-sheet No. 1N.W. as a dyke.

A small exposure of basalt occurs between Bell and O'Hea streets in the eastern bank. Both sides of the valley at Gaffney-street, Pascoe Vale, are Older Basalt.

The last exposure on the Moonee Ponds Creek in the area described occurs at the rear of a large house known as Oak Park. It is on the western bank, and consists of an amygdaloidal basalt in a very decomposed condition. It overlies beds of fine sands and silts of fluvial origin. Iron is practically absent from some of the beds, others are deeply impregnated with limonite. All of the beds contain fossil leaves. One bed about a foot thick is a mass of leaf impressions. This bed seems to be a replacement of a fine carbonaceous silt by limonite. The basalt is overlain by a quartzite which also contains fragments of leaves. All these exposures with the exception of those at Reynards-road and Gaffney-street are shown on the maps of the Victorian Geological Survey.

The fossil leaves from the exposures were first found in 1930 by the writer, and are identified and described by Miss H. Paterson, B.A.

Exposures on Dry Creek.

A number occur on Dry Creek and are not recorded elsewhere. The first exposure occurs at the intersection of Northumberland and Prospect streets, where the basalt is in all stages of decomposition. Some of the better preserved rock has a columnar structure and some of it is decomposed into a clay. The basalt overlies similar sands to those previously mentioned.

Some very thick beds of white pottery clay occur; they underlie and also outcrop on the surface alongside the basalt, as may be seen in a cutting in the road. The beds show a slight dip to the south-west and no fossils were found.

A small exposure of Older Basalt occurs at Arnst-street, and another at Kent-street, just north of a small bridge.

Exposures on Deanery Creek.

The first exposure on Deanery Creek is opposite the intersection of Kent and Sussex streets. It is a basalt decomposed to a white clay, which was excavated from a sewer. As no Newer Basalt in the district is decomposed to anything like the same degree, it was considered to be Older Basalt. The deposit is covered by Newer Basalt.

The second exposure on Deanery Creek is just outside the Fawkner Cemetery on its north side, and is near Sydney-road. It consists of a hard black basalt underlying red sands and grits.

Exposures on Merri Creek.

On Merri Creek there are a number of exposures, from Mellody's clay pits at Campbellfield, for about a mile to the east. At Mellody's there is an exposure of decomposed basalt very similar to that in the Moonee Ponds Creek and differing greatly from the surrounding Newer Basalt.

This Older Basalt overlies the clays and fine sands which outcrop extensively in this district and which are similar to those previously described from the Moonee Ponds Creek. Further east along the creek the basalt is decomposed to a white clay, and is partly overlying a bed of fine white silt and clay. The soft Tertiary rocks of this locality seem to have been protected from erosion on the north-west by Silurian rocks which evidently represent the sides of the older basaltic valley. The basalt filled the valley and covered the Tertiary sediments upon its floor. The basalt has since been eroded away, with the exception of that which occupies the depression of the actual watercourse on the floor of the valley, again exposing the Tertiary sands and clays. All the above-mentioned exposures of basalt are within sight of each other. They appear to belong to flows that filled the valley of a stream that flowed in a south-westerly direction and was either the upper portion, or more

probably a tributary, of the stream represented by the Older Basalts of Ascot Vale and Royal Park. The Older Basalt no doubt extended toward Thomastown and further east.

Other Exposures.

A few outcrops of sands occur, to which it is difficult to give a relationship.

A small outcrop at Montifore-street, Coburg, shows white pottery clay bedded with red sands to a depth of 16 feet. This rests on Silurian sandstones, and the whole is partly overlain by the post-Older Basaltic sands to be described later.

Another small outcrop surrounded by Newer Basalt occurs at Middle-street, Pascoe Vale. Both these outcrops are equivalent to the Campbellfield sands and clays and also to the leaf-beds on Moonee Ponds Creek.

The well-known Preston sands present the same difficulty. No Older Basalt and no fossils have been found. The beds seem to belong to the leaf-beds from their appearance. The Campbellfield clays, representing their extension northerly, have been located in bores just north of Major-road, Fawkner, and a small exposure of sands occurs on Edgar's Creek, north of Edwards Lake, Preston. The height above sea level of the base of the bed corresponds with that of the Campbellfield beds, the known Pliocene beds being 50 feet lower.

4. Lower Pliocene Beds.

The area also contains outcrops of sands and conglomerates laid down after the Older Basalt and before the Newer Basalt. These deposits have been laid down after an immense amount of erosion of the Older Basalt. The basalt was reduced to the remnants previously described before the sands were laid upon and around them.

They consist of a wide variety of materials, quartz predominating. Fragments of basalt are absent except close to an outcrop of this rock. No fossils have been secured except those mentioned as occurring in the quartzite near Oak Park.

The deposits in the area are known from excavations for sewers to a depth of 19 feet, and they occur in wide areas, some of which have not been recorded. An area one mile long and half a mile wide, that has not been recorded, is intersected by O'Hea and Sussex streets, Coburg. Further areas occur in Pascoe Vale and Campbellfield and are shown on the accompanying map. The deposits are of fluvial origin and consist of fine sand abruptly abutting on coarse sand or conglomerate. At Prospect-street, Pascoe Vale, a section of a trench showed Older Basalt overlain by a fine yellow sand containing ilmenite, which was followed in ascending order by grit one foot, fine

yellow sand two feet, grit one foot, then a coarse red sand gradually merging into a coarse conglomerate of quartz pebbles of various sizes, the biggest being the size of a fist. The fine sand was examined for fossils, and Mr. F. Chapman found fresh-water sponge spicules. The beds have been traced through West Brunswick and seem to correspond to the beds above the grit band at Royal Park, where the age of the upper beds is lower Pliocene.

The nearest point to the area where marine fossils have been found was in a shaft near Essendon Railway Station. The fossils were casts in ironstone similar to those at Royal Park and were laid down upon Older Basalt.

5. Alterations of Drainage.

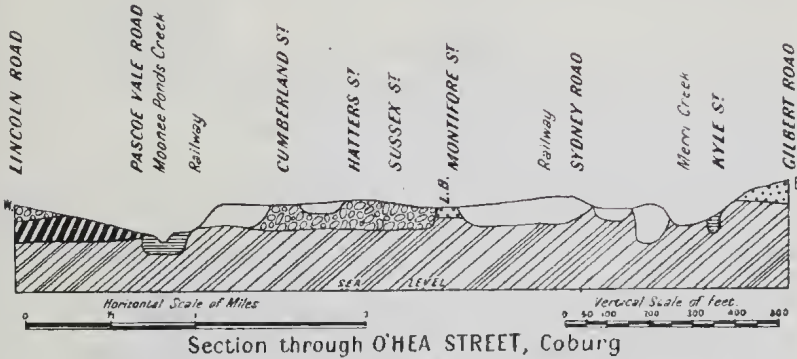
A point of interest in a study of the various valleys infilled by basalt is that there has been a local alteration of the direction of drainage.

The pre-Older Basaltic drainage was from Thomastown to the south-west through Flemington; while the pre-Newer Basaltic drainage was from Glenroy to the south-east, through Brunswick and Carlton, to the pre-Newer Basaltic Yarra River below Studley Park. There has been a further alteration since the outpouring of the Newer Basalt. The Moonee Ponds Creek closely follows the Older Basaltic line of drainage and the Merri Creek the Newer Basaltic. Just why the pre-Newer Basaltic streams took their course to the Yarra River is difficult to understand, as the streams appear to have been flowing south when the lower Pliocene sediments described were laid down. The probable explanation is that after the outpouring of the Older Basalt the drainage followed the margin of the flow, and in the period of erosion that followed, northern tributaries eroded a system of drainage that was gradually filled by river sediments during the period of sinking associated with the lower Miocene.

The drainage flowed south to the nearby sea during the lower Pliocene and, as the land rose again gradually, resumed the old valleys and eroded the river sediments out of them with the exception of a few residuals left on the higher levels.

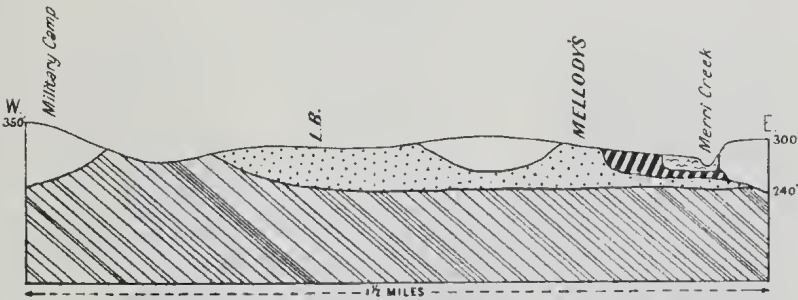
Summary.

The Older Basalts of the area are described and the Tertiary sands separated into pre-Older Basaltic leaf-beds and lower Pliocene beds. The localities from which fossils have been secured are recorded. Alterations of drainage are pointed out and the reason discussed.



LEGEND

- Pleistocene Newer Basalt Lower Phocene Older Basalt Tertiary, Leaf Beds Silurian



LEGEND

- Alluvium Newer Basalt Older Basalt Tertiary, Leaf Beds Silurian

Sections at Coburg and Campfield.

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GEOLOGICAL MAP OF BROADMEADOWS, PRESTON, ESSENDON AND COBURG.

Scale of Chains.



By W. Hanks.

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LEGEND

